JFSP Project Highlights

Research Supporting Sound Decisions

September 2004

Rapid Response Enables Additional Forest Floor Consumption and Smoke Characterization Sampling in Boreal Forests of Alaska

Forest fires are the dominant ecological force shaping the distribution and structure of boreal ecosystems. Boreal forests sequester one-third of the world's terrestrial carbon, so it is a critical question whether the frequency or severity of fires are changing with global warming. Major fire years in Alaska (more than 1 million acres) occur about once per decade when the deep organic layers become dry and the fire season extends well into the summer months, resulting in fires that are very difficult to control and have severe ecological and public safety consequences. Roger Ottmar from the Fire and Environmental Research Applications Team in Seattle, Washington was able to capitalize on the unusual wildfire activity this summer by extending and strengthening existing research efforts to assess forest floor consumption and smoke emissions from wildland fires burning in boreal forest fuel types in Alaska.

The study has gone extremely well to date with 15 of the 21 sets of plots established burned by the wildfires. Additional funding allowed the project to collect samples from tundra and sphagnum fuelbeds, which were not included in the original proposal, and obtain data for a more complete variety of fire conditions. In addition, two other studies funded by the Joint Fire Science Program (JFSP) utilized Roger Ottmar's coordination skills, efforts and logistical support to place their plots in the same general area to make the studies and use of JFSP support more efficient. These studies include:

1) Refinement and Development of Fire Management Decision Support Models Through Field Assessment of Relationships Between Stand Characteristics, Fire Behavior and Burn Severity (awarded in 2004; Dr. Ann Camp and Dr. Phil Omi principal investigators; Randi Jandt federal cooperator) and

2) Assessing the causes, consequences and spatial variability of burn severity: a rapid response proposal (awarded in 2003; Penny Morgan principal investigator).

The success of this research has been largely due to the excellent cooperation of Alaska Fire Service, State of Alaska, and Incident Command Teams who tactically and logistically supported the research team's effort. The research team also utilized smoke jumper Jake Dollard (AFS), who served as a liaison and helped coordinate fire activities and on-the-ground research logistics with Incident Commanders and support teams.

Measurements of forest floor consumption were obtained for several different fuelbed types over a large range of weather, fuel moisture and fire type conditions. During the week of June 20th, the frost layer was close to the surface, the dead, live moss and duff layers were wet and many of the forest floor consumption measurements showed only a "skiff" of forest floor reduction. Conversely, by July, with warmer and drier conditions and as the frost layer began to melt allowing moisture to drain from the forest floor layers into the mineral soil layers at accelerated rates, there was total forest floor consumption and many observation points were burned to mineral soil.

The JFSP, a partnership of six federal wildland fire and research organizations, provides scientific information and support for fuel and fire management programs.

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Flaming and smoldering emissions data were collected for five of the plots burned using the FASS tower system from the Fire Chemistry project in Missoula (WeiMin Hao, project leader). Several hundred smoldering smoke samples were collected for determining smoldering emission factors, smoldering rate production, and smoldering rate consumption following the fire front passage on the plots where towers were positioned and on several other sites where only fuel consumption plots were established. Finally, an infrared camera was positioned near the sites sampled for smoldering to evaluate smoldering consumption rate of the forest floor. The dry forest floor layers provided for excellent smoldering and residual smoke sampling opportunities.

Data collected during this effort will be used to develop and modify existing forest floor fuel consumption and emission rate equations, which will then be incorporated into Consume 3.0 by mid-2005.

Principal Investigators:

- Roger Ottmar, Research Forester
- Sue Ferguson, Research Atmospheric Scientist
- Robert Vihnanek, Forester

You can obtain further information at: http://www.fs.fed.us/pnw/fera/

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